AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions of claims in the application.

1. (Previously Amended) A box-shaped facing-targets sputtering apparatus comprising a box-shaped facing-targets sputtering unit and a vacuum chamber,

the sputtering unit including a rectangular parallelepiped frame having six faces, one of which serves as an opening face, and a pair of facing target units, each including a target and magnetic-field generation means formed of a permanent magnet which is provided so as to surround the target,

which magnetic-field generation means generates a facing-mode magnetic field extending in a direction perpendicular to the surface of the target and a magnetron-mode magnetic field extending in a direction parallel to the target surface, in which the target units are provided on first opposing faces of the frame which are located adjacent to the opening face, and second opposing faces and the remaining one face of the frame are shut by shutting plates,

wherein the sputtering unit is provided on the vacuum chamber such that the opening face faces the vacuum chamber and a substrate on which a thin film is to be formed, the substrate being disposed in the vacuum chamber; and an anode electrode comprises substantially the frame and the shutting plates; and further comprising an auxiliary electrode which absorbs electrons, in a plasma confinement space being provided in the interior of the sputtering unit.

2. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, wherein each of said pair of facing target units comprises a support which has a receiving section

for receiving the target at a center thereof, an accommodating section for accommodating a permanent magnet in a peripheral wall defining the receiving section, and electron reflection means for reflecting electrons, wherein the electron reflection means is disposed at a front end portion of the peripheral wall or in the vicinity of the front end portion.

3. (Original) A box-shaped facing-targets sputtering apparatus according to claim 2, wherein the auxiliary electrode is provided in front of the electron reflection means.

4. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, wherein the auxiliary electrode is provided on a center line of the plasma confinement space or in the vicinity of the center line, the center line extending in parallel to the targets.

5. (Original)A box-shaped facing-targets sputtering apparatus according to claim 4, the center line extending along a direction parallel to the longer side of the targets.

6. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, wherein the auxiliary electrode is a U-shaped electrode formed from an electrically conductive material, and is attached to a closure plate which covers a face that is opposite to the opening face.

7. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, wherein the auxiliary electrode is made of an electrically conductive pipe and is attached to a closure plate which covers its corresponding face so as to cool the auxiliary electrode.

8. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, further comprising yoke means which magnetically connects open-side facing magnetic poles of the permanent magnets of each of the target units, the magnetic poles being located on the outward side of the unit.

9. (Original) A box-shaped facing-targets sputtering apparatus according to claim 8, wherein the yoke means comprises, on the support of the facing target units, pole sections made of a magnetic material so as to cover the open-side magnetic poles of the permanent magnets, and a connection section formed of a magnetic material which is provided on a face of the box-shaped sputtering unit so as to magnetically connect the pole sections.

10. (Original) A box-shaped facing-targets sputtering apparatus according to claim 9, wherein the connection section is formed of a plate having an opening, and is provided on the opening face of the box-shaped sputtering unit.

11. (Original) A box-shaped facing-targets sputtering apparatus according to claim 1, which further comprises magnetic-field regulation means for predominantly regulating a magnetron-mode magnetic field which is provided on the back side of each of the targets.

12. (Original) A box-shaped facing-targets sputtering apparatus according to claim 11, wherein the magnetic-field regulation means is a permanent magnet.

13. (Currently Amended) A method for producing a compound thin film, comprising the steps of:

providing a box-shaped facing-targets sputtering apparatus comprising a box-shaped facing-targets sputtering unit and a vacuum chamber,

the sputtering unit including a rectangular parallelepiped frame having six faces, one of which serves as an opening face, and a pair of facing target units, each including a target and magnetic-field generation means formed of a permanent magnet which is provided so as to surround the target,

which magnetic-field generation means generates a facing-mode magnetic field extending in a direction perpendicular to the surface of the target and a magnetron-mode magnetic field extending in a direction parallel to the target surface, in which the target units are provided on first opposing faces of the frame which are located adjacent to the opening face, and second opposing faces and the remaining one face of the frame are shut by shutting plates,

wherein the sputtering unit is provided on the vacuum chamber such that the opening face faces the vacuum chamber and a substrate on which a thin film is to be formed, the substrate being disposed in the vacuum chamber; and further comprising an auxiliary electrode which absorbs electrons, in a plasma confinement space being provided in the interior of the sputtering unit; ~~and~~

~~placing an object in the sputtering apparatus.~~

placing the substrate at the disposed position in the sputtering apparatus; and

forming the compound thin film on the substrate by sputtering.

14. (Original) A method for producing a compound thin film according to claim 13, wherein the compound thin film is oxide thin film or nitride thin film.

15. (Original) A method for producing a compound thin film according to claim 14, wherein the compound thin film is oxide thin film, and the film is formed by use of an oxide target predominantly containing an oxide which constitutes the thin film, in the presence of an inert gas which serves as a sputtering gas and contains oxygen in an amount of 1 vol.% or less.

16. (Original) A method for producing a compound thin film according to claim 15, wherein the oxide thin film is a transparent electrically conductive thin film.

17. (Original) A method for producing a compound thin film according to claim 16, wherein the oxide thin film is indium tin oxide thin film.

18. (Original) A method for producing a compound thin film according to claim 13, wherein the compound thin film is nitride thin film, and the film is formed by use of a nitrogen-containing inert gas serving as a sputtering gas and containing oxygen in an amount of 1 vol.% or less, and a target predominantly containing the nitride-constituting elements other than nitrogen.

19. (Original) A method for producing a compound thin film according to claim 18, wherein the nitride thin film is silicon nitride thin film.

20. (Original) A method for producing a compound thin film according to claim 13, wherein the thin film is formed while the substrate is allowed to stand at room temperature.

21. (Original) A method for producing a compound thin film according to claim 13, wherein the sputtering current is a DC current.

22. (Original) A method for producing a compound thin film according to claim 13, wherein the substrate on which the film is formed or a surface layer of the substrate is formed of an organic substance.